

## EFFECT OF DAIRY EFFLUENT ON GROWTH AND PHYSIOLOGICAL PARAMETERS OF BRASSICA (BRASSICA RAPA), RAGI (ELEUSINE CORACANA), COWPEA (VIGNA UNGUICULATA) AND SOY BEAN (GLYCINE MAX)

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### ABSTRACT

*An experiment was carried out to study the influence of dairy effluent on growth and physiological parameters in four crops: Brassica (Brassica rapa), Ragi (Eleusinecoracana), cowpea (Vignaunguiculata) and Soybean (Glycine max) during 2010 to 2011 in University of Agricultural Sciences (UAS), Gandhi KrishiVignan Kendra (GKVK), Bengaluru. Degree of toxicity of dairy effluent on seed germination and seedling growth and biochemical parameters of four crops-Brassica (Brassica rapa), Ragi (Eleusinecoracana), cowpea (Vignaunguiculata) and Soybean (Glycine max) were studied. The degree of toxicity depends upon the nature and concentration of chemicals present in the effluent, as well as the type of crops grown. The present investigation was carried out with 4 (T1, T2, T3 and T4), with four replications each, with different concentrations (100%, 75%, 50%, 25%) and (T5 and T6) with treated effluent (carried out in Biofuel Laboratory and Mother Dairy Treatment Plant). They were used for irrigation respectively. Untreated and treated effluent was analyzed for various physico-chemical parameters. The untreated showed higher values of COD (1171.82 mg/L), BOD (634.06 mg/L), TDS (734.4 mg/L), Oil content (138.33 mg/L). The toxicity of dairy effluent was more pronounced on seed germination in all the four crops at higher concentration of dairy effluent. The percentage of germination at 15 DAS, the growth parameters and biochemical parameters at 30 DAS were found to be increased in 25 % dairy effluent and decreased from 50% to 100%. Overall, the 25 % effect showed highest and significant results in most of the parameters whereas treated effluent, at mother dairy was given the best results compare to effluent treated at Biofuel center laboratory (Sand+Clay+Ferric Chloride) the 25% effluent concentration is suitable for irrigation. The present investigation showed that, seed germination, growth parameters and biochemical parameters can be assessed the degree of toxicity of industrial effluent.*

**KEYWORDS:** Brassica (Brassica rapa), Ragi (Eleusinecoracana), cowpea (Vignaunguiculata) & Soybean (Glycine max)

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### INTRODUCTION

Environmental pollution is one of the major problems of the world and it is increasing day by day due to urbanization and industrialization. Over the last few decades large scale usage of chemicals in various human activities has grown very fast, particularly in a country like India which has to go for rapid industrialization in order to sustain over growing large problem of population (Mustafa et al., 2010). The current pattern of industrial activity alters the natural flow of materials and introduces novel chemicals into the environment. The released organic compounds and heavy metals are one of the key factors that exert negative influences on man and environment causing toxicity to plants and other forms of biotics and abiotics that are continually exposed to potentially toxic heavy. Use of waste water in agriculture is gaining importance now a day, because of its value as potential irrigant and a nutrient donor. Use of waste water for irrigation makes possible to conserve the limited

water resources for crops production and also prevent pollution of water bodies as soil is a very good sink. Also application of this waste water to agricultural land may promote the growth of crop and conserve water and nutrients

## MATERIALS AND METHODS

An experiment was carried out to study the influence of dairy effluent on growth and physiological parameters in four crops: Brassica (*Brassica rapa*), Ragi (*Eleusinecoracuna*), cowpea (*Vigna unguiculata*) and Soybean (*Glycine max*) during 2010 to 2011 at University of Agricultural Sciences (UAS), Gandhi Krishi Vignan Kendra (GKVK), Bengaluru, Karnataka. The experiment was laid out in completely randomized design with four replications.

The dairy effluent used for irrigation was analyzed as per the procedure. Germination percentage was calculated after six days of sowing. After six days of sowing, plants in each pot were retained, weeding was done thrice and soil loosened to give aeration. The plants were harvested after 30 days and fresh weight and dry matter weight were recorded. In an independent experimentation of the physical and chemical treatment were tried to ameliorate the dairy effluent as given below. The experiment consisting of five treatments and analysis was done independently.

## RESULTS AND DISCUSSIONS

The plant height was found to be decreased by increasing the dairy effluent concentration. Among the combination of effluent with DE, application of 25 per cent effluent with DE noticed significantly higher plant height. Similar findings were reported by Kannan and Raj (2008). Influence of dairy effluent treatment showed profound effect on number of leaves/plant. The number of leaves per plant was highest at 25 per cent and there was a decrease in the number of leaves up to 100 per cent compared to other treatments for all crops.

The total dry matter was found to be affected by the effluent. The application of effluent at different concentration showed that the dry matter was reduced as the concentration of DE was increased in concentration. The combination of 25 per cent effluent with DE yielded highest dry matter in all crops. Similar results were also reported by Chidankumar (2009), Dhanam (2009) and Rudra Gupta and Shukla (2006).

## CONCLUSIONS

In the pot experiment conducted under protective irrigation with four crops (Brassica, Ragi, Cow pea and Soybean), bore well water was found to be superior to other treatments for all crops with respect to germination percentage (95%, 97.5%, 95% and 95%). There was decrease in the germination percentage with increase in the quantity of effluent irrigated in dilution and the lowest value was recorded in raw effluent (65%, 67.5%, 66%, and 57.5%). The dry matter was high in 25 per cent effluent dilution in (Brassica, Ragi and Soybean) with (3, 4148 g, 2.7610 g, and 2.4875 g) and with 4.74713 g in control for cowpea. These results are in conformity with the findings of Satyanarayana Rao (1980), Chidankumar (2009) and Dhanam (2009).

**Table 1: Effect of Treated Dairy Effluents on Germination Percentage, Number of Leaves and Dry Matter (30DAS) of Brassica, Ragi, Cowpea and Soybean**

	Brassica			Ragi			Cowpea			Soybean		
	T <sub>1</sub>	T <sub>2</sub>	T <sub>3</sub>	T <sub>1</sub>	T <sub>2</sub>	T <sub>3</sub>	T <sub>1</sub>	T <sub>2</sub>	T <sub>3</sub>	T <sub>1</sub>	T <sub>2</sub>	T <sub>3</sub>
Germination Percentage	92.5	92.5	95	79.87	95	97.5	92.5	95.0	92.5	92.5	95.0	95.0
Number of Leaves	5.25	5.50	4.50	5.25	5.25	4.50	2.75	2.5	3.0	5.50	5.25	6.0
Dry Matter (30DAS)	3.19	3.06	3.33	2.53	2.48	2.62	4.20	4.26	4.74	2.14	2.32	2.34

T<sub>1</sub>: Raw effluent T<sub>2</sub>: Effluent treated @ dairy T<sub>3</sub>: Sand filtrate+ Potassium alum

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